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EXAMINER

AKRAM, IMRAN

ART UNIT

PAPER NUMBER

1795

NOTIFICATION DATE

DELIVERY MODE

12/08/2009

ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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## **DETAILED ACTION**

### ***Response to Arguments***

1. Applicant's arguments filed 7/29/09 have been fully considered but they are not persuasive. The Raoux reference still anticipates the independent claims as shown previously.
2. As interpreted by the Examiner, the Applicant has two main arguments found throughout pages 9-12 of the Arguments filed on 7/29/09. Firstly, that the volatilizing electromagnetic energy source of the claim (element 5 of the Raoux reference) is not located downstream of the processing chamber of Raoux. And secondly, that the impedance value measured in Raoux does not correspond to an amount of solid material in the medium of interest.
3. In regards to the first assertion, Examiner would like to note the language used in the claims for the location of the electromagnetic energy source. In claim 14, the language reads, "a volatilizing electromagnetic energy source downstream from the plasma processing chamber coupled to the flow path for exciting said medium of interest so as to volatilize the solid material when present"; and in claim 19, the language reads, "a volatilizing electromagnetic energy source coupled to an effluent carrying conduit downstream from a plasma processing chamber." Notice that the language used in both claims recites the source of electromagnetic energy to be downstream of the processing chamber but neither requires that the actual volatilization occur downstream of the process chamber. Element 5 in Raoux is the electromagnetic source and by Applicant's own admission it is downstream of the chamber (see page 11 of the

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Arguments). It is coupled to the plasma processing chamber in which it is capable of volatilizing the solid components in the chamber and the product leaving the chamber through the effluent conduit. The actual location of volatilization is intended use language of the claims.

4. In regards to the second assertion, a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. Impedance values are measured in Raoux and are capable of being used to correspond to the amount of solid in the medium of interest.

### ***Claim Rejections - 35 USC § 112***

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claim 26 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

7. Claim 26 recites the limitation "said photoresist material" in line 2 of the claim. There is insufficient antecedent basis for this limitation in the claim.

***Claim Rejections - 35 USC § 102***

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

9. Claims 14, 15, 17-20, 22-26, 32, and 33 are rejected under 35 U.S.C. 102(e) as being anticipated by Raoux (US 7,004,107 B1).

10. Regarding claim 14, Raoux discloses a plasma processing chamber **30** configured to uniformly convey plasma onto a surface of a work-piece **36** contained therein (column 4, lines 47-62); a flow path **89** in fluid communication with the processing chamber, the flow path configured to contain a medium of interest transported to and from the plasma processing chamber, wherein the medium of interest contains a solid material and/or gaseous byproduct removed from the work-piece (column 6, lines 26-32); a volatilizing electromagnetic energy source **5** downstream from the plasma processing chamber coupled to the flow path for exciting said medium of interest so as to volatize the solid material when present (column 9, lines 1-30); and an impedance measuring device **110** for measuring an impedance value of an electromagnetic circuit, said electromagnetic circuit including said flow path therein, wherein said impedance value corresponds to an amount of solid material within said medium of interest (column 18, lines 40-62).

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11. Regarding claim 15, Raoux discloses that said electro-magnetic circuit further comprises a radio frequency (RF) circuit (column 4, lines 58-62).

12. Regarding claims 17 and 18, Raoux discloses a mechanism for determining variations of said impedance magnitude and phase values over time (column 17, lines 31-38).

13. Regarding claim 32, Raoux discloses that the electromagnetic energy source is configured to provide a high power and a low power duty cycle, wherein the high power duty cycle is effective to vaporize volatize the solid material, and wherein the impedance measuring device is configured to be operative during the low power duty cycle (column 18, lines 40-62).

14. Regarding claim 19, Raoux discloses a plasma processing chamber **30** configured to uniformly convey plasma onto a surface of a work-piece **36** contained therein (column 4, lines 47-62); a volatilizing electromagnetic energy source **5** coupled to an effluent carrying conduit downstream from a plasma processing chamber, wherein the volatilizing electromagnetic energy source is configured to cause excitation of a gas having reactive species therein, wherein the excited gas may include a solid material and/or gaseous byproduct removed from a semiconductor work-piece, and wherein the excitation is effective to volatize the solid material when present (column 6, lines 26-32); a mechanism **40** for uniformly conveying the excited gas; and an impedance measuring device **110** for measuring an impedance value of an electromagnetic circuit, said electromagnetic circuit including said excited gas therein, wherein said impedance value corresponds to an amount of the solid material within said gas (column 18, lines 40-62).

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15. Regarding claim 20, Raoux discloses that said electro-magnetic circuit further comprises a radio frequency (RF) circuit (column 4, lines 58-62).

16. Regarding claims 22 and 23, Raoux discloses a mechanism for determining variations of said impedance magnitude and phase values over time (column 17, lines 31-38).

17. Regarding claims 24 and 25, Raoux discloses that said downstream electromagnetic energy source is configured to apply power at a power level of about 300 W (column 19, lines 36-39).

18. Regarding claim 26, Raoux discloses that said impedance measuring device is configured for facilitating endpoint detection of removal of said photoresist material (column 4, lines 62-65).

19. Regarding claim 33, Raoux discloses that the electromagnetic energy source is configured to provide a high power and a low power duty cycle, wherein the high power duty cycle is effective to vaporize volatize the solid material, and wherein the impedance measuring device is configured to be operative during the low power duty cycle (column 18, lines 40-62).

### ***Claim Rejections - 35 USC § 103***

20. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

21. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

22. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

23. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Raoux as applied to claim 19 above.

24. Raoux does not disclose the downstream electromagnetic source to be microwaves. However, Raoux discloses a secondary, upstream source of microwaves 4 to provide additional microwave plasma (column 10, lines 39-45). It would have been obvious to one having ordinary skill in the art at the time of invention to use the downstream electromagnetic energy source to excite said medium of interest of Raoux



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into a microwave plasma instead of using a secondary source to do so to streamline the operation if microwave plasma was desired.

### ***Conclusion***

25. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to IMRAN AKRAM whose telephone number is (571)270-3241. The examiner can normally be reached on 10-7 Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa Neckel can be reached on 571-272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Imran Akram/  
Examiner, Art Unit 1795

/Jennifer K. Michener/  
Supervisory Patent Examiner, Art Unit 1795